



ODVB SERIES

Gas Fired Boilers For Forced Hot Water

INSTALLATION, OPERATION & MAINTANANCE MANUAL



An ISO 9001-2000 Certified Company



ECR International, LTD
P.O. Box 900 Wallaceburg, ON N8A5E5

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GAS FIRED BOILERS FOR FORCED HOT WATER

**KEEP THIS MANUAL NEAR BOILER AND
RETAIN FOR FUTURE REFERENCE.**

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**IMPORTANT: Read the following instructions
COMPLETELY before installing!**

SAFETY SYMBOLS

The following defined symbols are used throughout this manual to notify the reader of potential hazards of varying risk levels.



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or property damage.

NOTICE

Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.



C.S.A. Certified for
Natural gas or Propane



Tested for 100 lbs.
ASME Working Pressure



INTRODUCTION

WARNING

1. Keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids.
2. **DO NOT** obstruct air openings to the boiler room.
3. Modification, substitution or elimination of factory equipped, supplied or specified components may result in property damage, personal injury or the loss of life.
4. **TO THE OWNER:** Installation and service of this boiler must be performed by a qualified installer.
5. **TO THE INSTALLER:** Leave all instructions with the boiler for future reference.
6. When this product is installed in the Commonwealth of Massachusetts the installation must be performed by a Licensed Plumber or Licensed Gas Fitter.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

1. The installation must conform to the requirements of the authority having jurisdiction or, in absence of such requirements, to the latest revision of the National Fuel Gas Code, ANSI Z223-1. (Available from the American Gas Association, Pleasant Valley Road, Cleveland, Ohio 44134.) Reference should also be made to local gas utility regulations and other codes in effect in the area in which the installation is to be made.
2. Where required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME No. CSD-1.
3. This boiler is classified as a Category I and III and vent installation shall be in accordance with the latest revision of the National Fuel Gas Code, ANSI Z223.1 or applicable provisions of the local building codes.
4. LOCATE BOILER on level, solid base as near the outside wall as possible and centrally located with respect to the heat distribution system as practicable.

5. Allow 24 inches at the front and right side for servicing and cleaning.
6. When installed in utility room, the door should be wide enough to allow the largest boiler part to enter, or to permit replacement of another appliance such as a water heater.
7. The boiler shall be installed such that the gas ignition system components are protected from water, (dripping, spraying, rain, etc.), during appliance operation and service, (circulator replacement, condensate trap, control replacement, etc.).
8. FOR INSTALLATION ON NON-COMBUSTIBLE FLOORS ONLY. *The boiler must not be installed on carpeting. Minimum clearances to combustible constructions are:

TOP	18 IN.
FRONT	6 IN.
FLUE CONNECTOR	6 IN.
REAR.....	4 IN.
CONTROL SIDE.....	9 IN.
OTHER SIDE	3 IN.
VENT PIPE	6 IN.

NOTES:

• Greater clearances for access should supersede fire protection clearances.

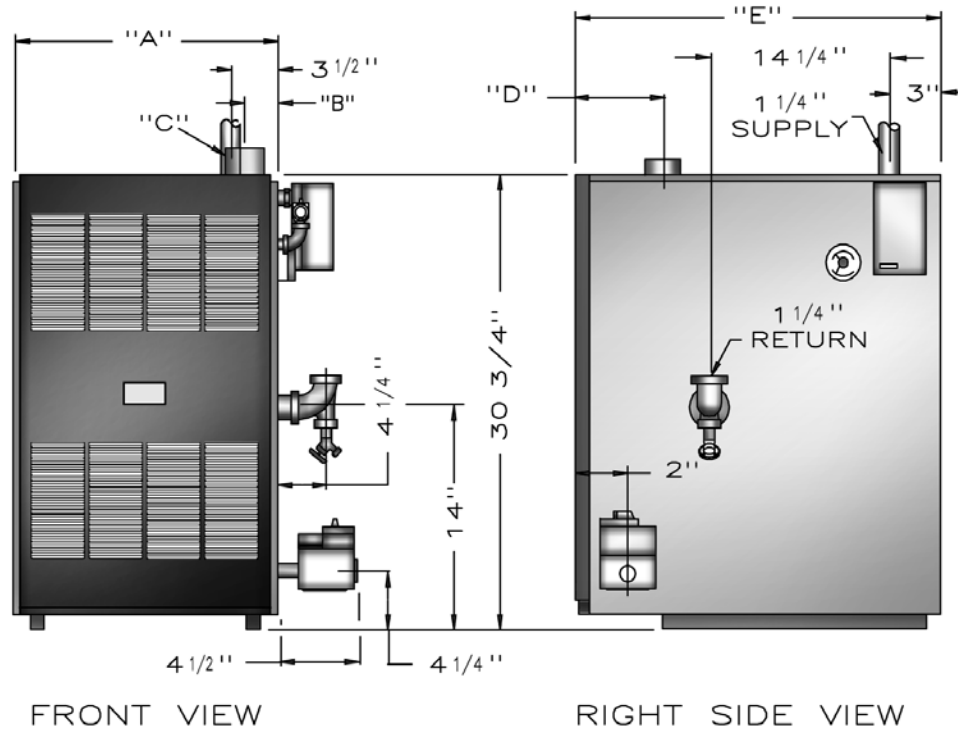
* For installation on combustible flooring Special Base **MUST BE USED**. (See Replacement Parts Section)

BOILER RATINGS, CAPACITIES & DIMENSIONS

⚠ WARNING

ALL INSTALLATIONS OF BOILERS AND VENTING SHOULD BE DONE ONLY BY A QUALIFIED EXPERT AND IN ACCORDANCE WITH THE APPROPRIATE UTICA BOILERS MANUAL. INSTALLING OR VENTING A BOILER OR ANY OTHER GAS APPLIANCE WITH IMPROPER METHODS OR MATERIALS MAY RESULT IN SERIOUS INJURY OR DEATH DUE TO FIRE OR TO ASPHYXIATION FROM POISONOUS GASES SUCH AS CARBON MONOXIDE WHICH IS ODORLESS AND INVISIBLE.

BOILER DIMENSIONS



DIMENSIONS FOR NATURAL GAS

Model #	Natural Gas Inlet	Dimensions					Pump size Supply & Return Tappings	Number of Burners	AFUE Ratings
		A	B	C	D	E			
-50	1/2"	11 1/4	2 7/8	3	6 3/8	27	1 1/4"	1	83%
-100	1/2"	15 1/8	4 1/8	3	6 3/8	27	1 1/4"	2	82%
-125	1/2"	19	6	3	6 3/8	27	1 1/4"	3	82%
-150	1/2"	19	6	4	6 3/8	27	1 1/4"	3	80%
-200	1/2"	22 7/8	8	4	7	28	1 1/4"	4	80%

NOTE: For altitudes above 2,000 ft. ratings should be reduced at the rate of 4% for each 1,000 ft. above sea level.

BOILER RATINGS, CAPACITIES & DIMENSIONS

Model #	A.G.A. Input Btu/Hr.	Heating Capacity Btu/Hr.	I=B=R NetOutput Btu/Hr	No. of Burners	Water Content (Gals.)	AFUE Ratings
-50	50,000	42,000	37,000	1	2.4	83%
-100	100,000	82,000	71,000	2	4.0	82%
-125	125,000	103,000	90,000	3	5.6	82%
-150	150,000	122,000	106,000	3	5.6	80%
-200	199,999	160,000	139,000	4	7.2	80%

STANDARD EQUIPMENT: Boiler Jacket, Cast Iron Boiler Battery, Combination Aquastat Relay, Theraltimeter Gauge, Circulator, Main Gas Burners, Electric Ignition System, A.S.M.E relief Valve, Drain Valve, Induced Draft Fan, and Safety Pressure Switch

All boilers are design certified for installation on non-combustible floors. For installation on combustible floors, use combustible floor kit.

This boiler is a Category III Designed Certified appliance which requires a special horizontal through the wall venting system. Only HEAT-FAB SAF-T-VENT™, FLEX-L STAR-34™, ProTech™ FasNSeal, and Z-FLEX Z-VENT™ vent material products shall be used.

Should a chimney installation be required, see venting addendum.

See venting addendum for maximum vent lengths and proper configurations.

MEA number for the boilers is 415-90-E.

Electric service to be 120 Volts, 15 Amps, 60 Hz.

**For equivalent square feet of radiation, divide I=B=R output by 150.



WARNING

AIR OPENINGS TO COMBUSTION AREA MUST NOT BE OBSTRUCTED. BY FOLLOWING THE INSTRUCTIONS BELOW, ADEQUATE COMBUSTION AIR CAN BE MAINTAINED.

COMBUSTION AIR REQUIREMENTS (Minimum Square Inch Openings)				
MODEL #	*UNCONFINED AREA		**CONFINED AREA	
	OUTSIDE COMBUSTION AIR 1 SQ. IN./5000 BTU/HR (SEE Figure #2)	INSIDE COMBUSTION AIR 1 SQ. IN. /1000 BTU/HR (SEE Figure #1)	OUTSIDE COMBUSTION AIR	
			VERTICAL DUCTS 1 SQ. IN. /4000 BTU/HR (SEE Figures #2 & 3)	HORIZONTAL DUCTS 1 SQ. IN. /2000 BTU/HR (SEE Figure #4)
-50	10	100	13	25
-100	20	100	25	50
-125	25	125	32	63
-150	30	150	38	75
-200	40	200	50	100

* **Unconfined Area:** A space whose volume is not less than 50 cubic feet per 1000 BTU per hour of all appliances installed in that space (cubic feet of space = height x width x length).

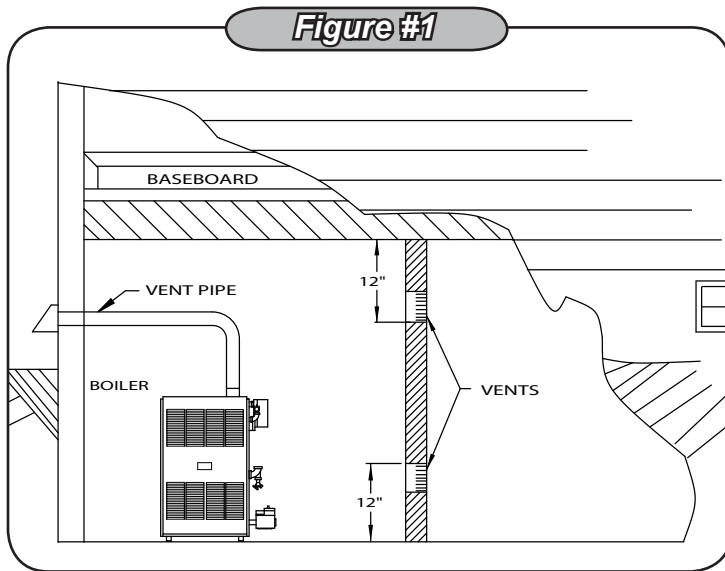
** **Confined Area:** A space whose volume is less than 50 cubic feet per 1000 BTU per hour of all appliances installed in that space (cubic feet of space = height x width x length).

1. Ventilation of the boiler room must be adequate to provide sufficient air to properly support combustion per the latest revision of the National Fuel Gas Code, ANSI Z223.1.
2. When a boiler is located in an unconfined space in a building or conventional construction frame, masonry or metal building, infiltration normally is adequate to provide air for combustion and ventilation. However, if the equipment is located in a building of tight construction (See the National Fuel Gas Code, ANSI Z223.1 latest

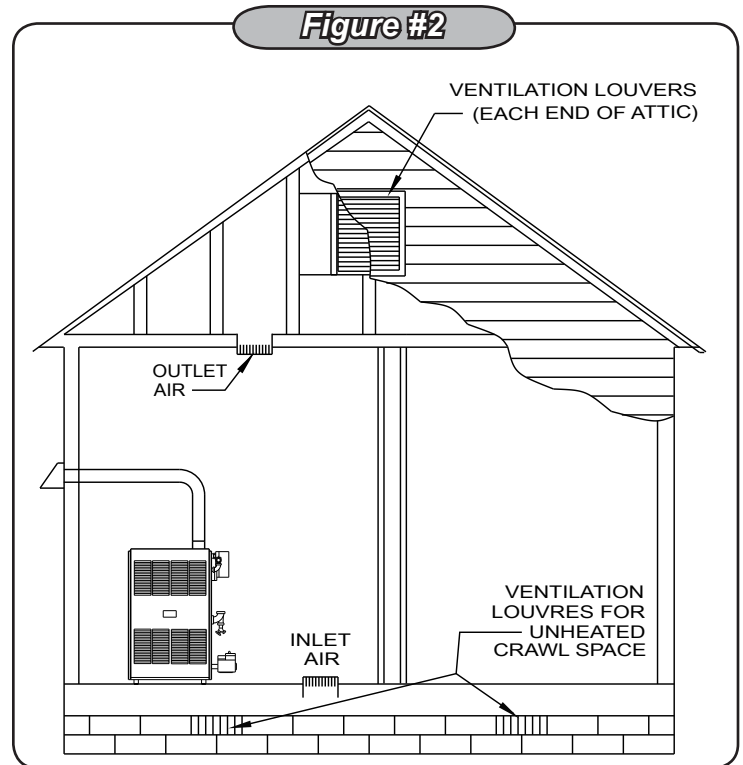
revision), the boiler area should be considered as a confined space. In this case air for combustion and ventilation shall be provided according to paragraph #5. If there is any doubt, install air supply provisions in accordance with the latest revision of the National Fuel Gas Code.

3. When a boiler is installed in an unconfined space, in a building of unusually tight construction, air for combustion and ventilation must be obtained from outdoors or from spaces freely communicating with the outdoors. A permanent opening or openings having a total free area of not less than 1 square inch per 5,000 BTU per hour of total input rating of all appliances shall be provided. Ducts may be used to convey makeup air from the outdoors and shall have the same cross-sectional area of the openings to which they are connected.
4. When air for combustion and ventilation is from inside

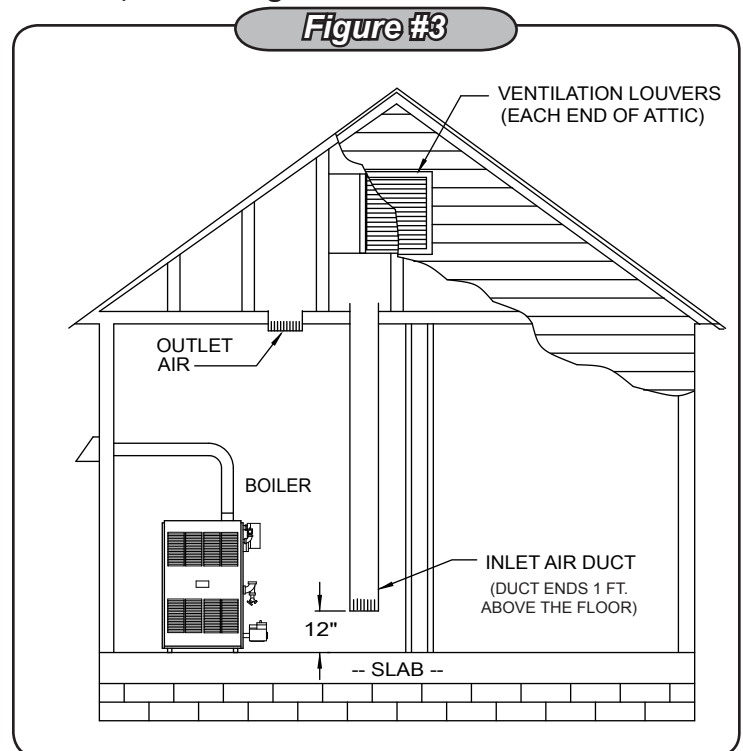
buildings, the confined space shall be provided with two permanent openings, one starting 12 inches from the top and one 12 inches from the bottom of the enclosed space. Each opening shall have a minimum free area of 1 square inch per one thousand (1000) BTU per hour of the total input rating of all appliances in the enclosed space, but must not be less than one hundred (100) square inches. These openings must freely communicate directly with other spaces of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. See **Figure #1**.



5. When the boiler is installed in a confined space and all air is provided from the outdoors the confined space shall be provided with one or two permanent openings according to methods A or B. When ducts are used, they shall be of the same cross sectional area as the free area of the area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be not less than 3 x 3 inches or 9 square inches.
 - A. When installing two openings, one must commence within 12 inches from the top and the other within 12 inches from the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. One of the following methods must be used to provide adequate air for ventilation and combustion.
 - I. When directly communicating with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 BTU per hour of total input rating of all equipment in the enclosure. See **Figure #2**.

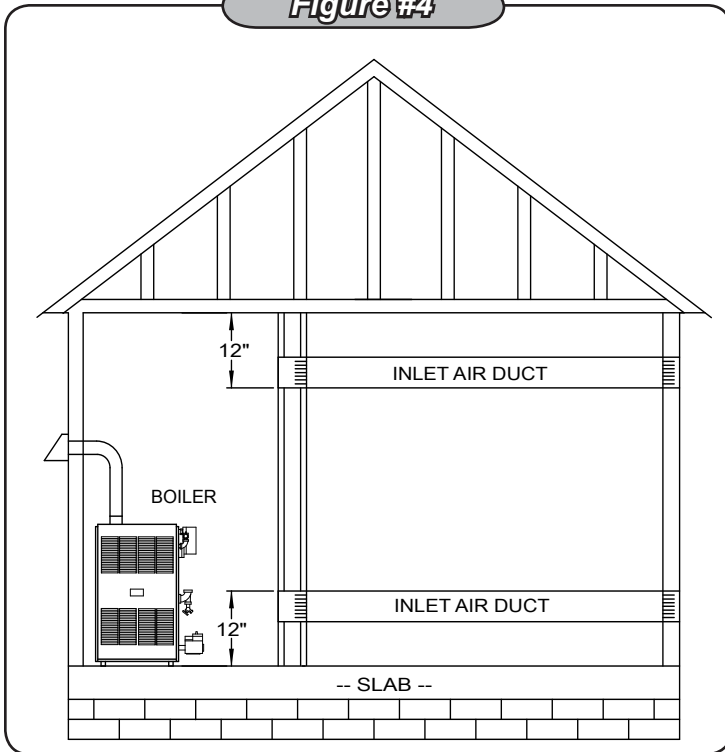


- II. When communicating with the outdoors by means of vertical ducts, each opening shall have a minimum free area 1 square inch per 4,000 BTU per hour of total input rating of all appliances in the enclosed space. See **figure #3**.



- III. If horizontal ducts are used, each opening and duct shall have a minimum free area 1 square inch per 2,000 BTU per hour of total input rating of all appliances in the enclosed space. See **figure #4**.

Figure #4



6. In calculating free area using louvers, grilles or screens for the above, consideration shall be given to their blocking effect. Screens used shall not be smaller than 1/4 inch mesh. If the free area through a design of louver or grill is known, it should be used in calculating the size opening required to provide the free area specified. If the design and free area is not known, it may be assumed that wood louvers will have 20-25% free area and metal louvers and grilles will have 60-75% free area. Louvers and grilles should be fixed in the open position or interlocked with the boiler so they are opened automatically during the boiler operation.

- B. One permanent opening, commencing within 12 inches of the top of the enclosure, shall be permitted where the equipment has clearances of at least 1 inch from the sides, 1 inch from the back, and 6 inches from the front of the boiler. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. The openings must have a minimum free area of 1 square inch per 3000 Btu per hour of the total input rating of all equipment located in the enclosure. The free area must be no less than the sum of the areas of all vent connectors in the confined space.

IMPORTANT: Circulators in the following illustrations are mounted on the system supply side, but mounting on the system return side is also acceptable practice.

1. Connect supply and return piping as suggested in **figure #5**, when the boiler is used in connection with refrigerated systems.
 - A. The chilled medium **MUST BE PIPED IN PARALLEL** with the boiler.
 - B. Use appropriate valves to prevent the chilled medium from entering the heating boiler.
 - I. During heating cycle open valves A and B, close valves C and D.
 - II. During cooling cycle, open valves C and D, close valves A and B.
 - C. Maintain a minimum clearance of one inch to hot water pipes.
2. When the boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, the boiler piping system **MUST BE** supplied with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.
3. Hot water boilers installed above radiation level must be provided with a low water cut-off device.
4. When a boiler is connected to a heating system that utilizes multiple zoned circulators, each circulator must be supplied with a flow control valve to prevent gravity circulation.
5. Hot water boilers and system must be filled with water and maintained to a minimum pressure of 12 pounds per square inch.
6. Bypass piping is an option which gives the ability to adjust the supply boiler water temperature to fit the system or the condition of the installation. This method of piping, however, is not typically required for baseboard heating systems. Typical installations where bypass piping is used are as follows:
 - A. This method is used to protect boilers from condensation forming due to low temperature return water. Generally noticed in large converted gravity systems or other large water volume systems. See **figure #6**.
 - B. This method is used to protect systems using radiant panels and the material they are encased in from high temperature supply water from the boiler. And protect the boiler from condensate. See **figure #7** and **#8**.

Figure #5

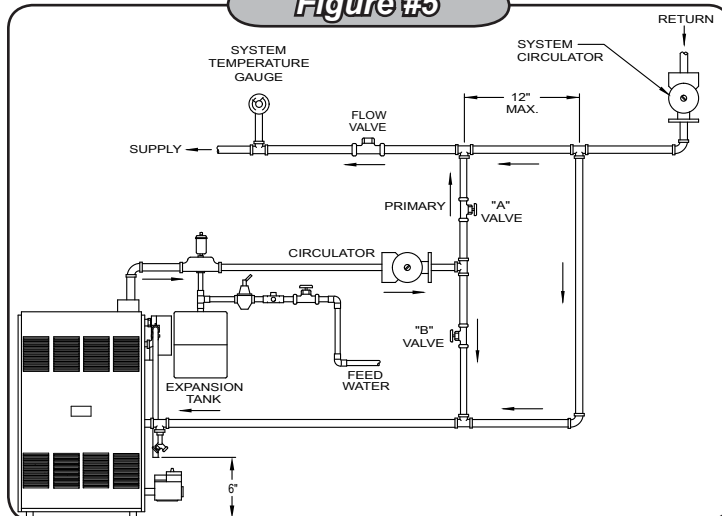


Figure #6

BYPASS PIPING

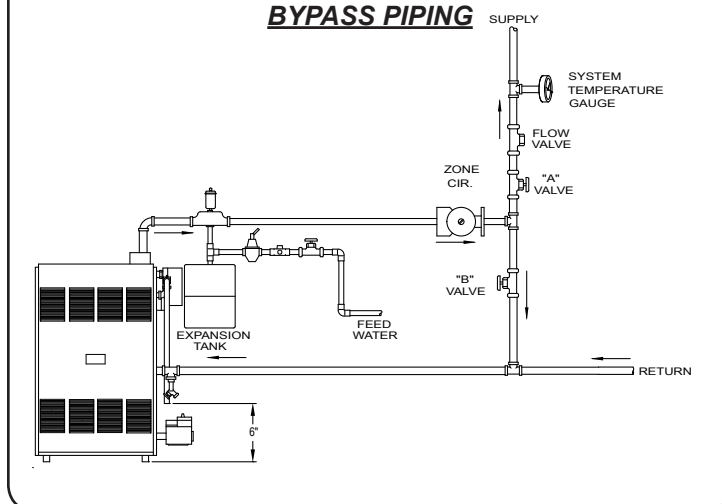


Figure #7

MIXING VALVE PIPING

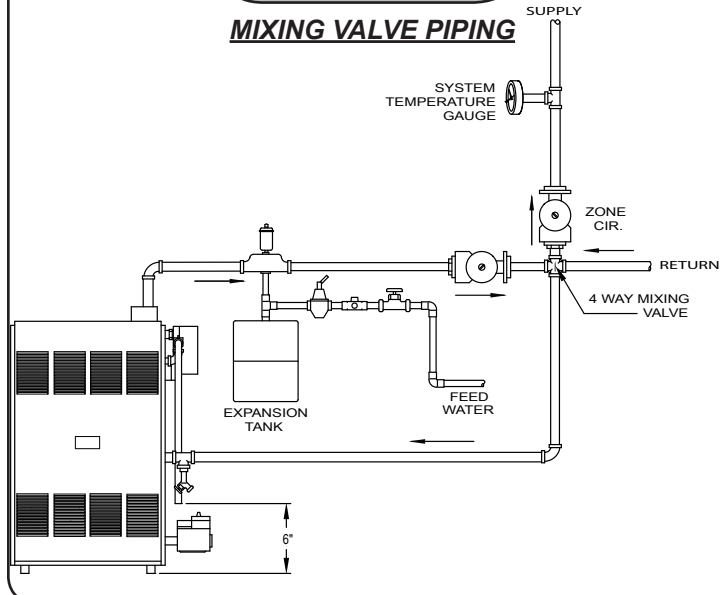
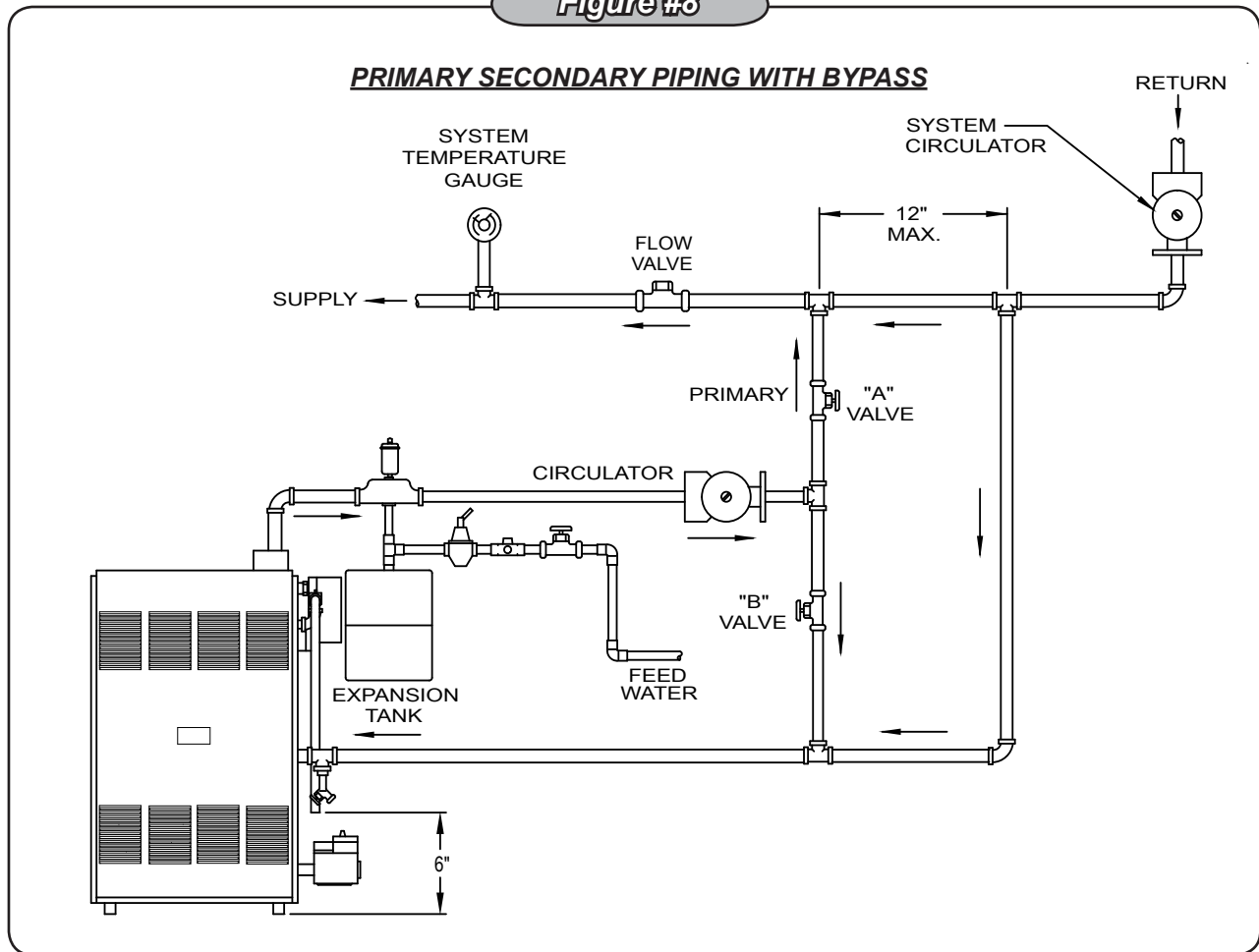


Figure #8



- C. This method is used to protect boilers from condensate forming as well as protecting the heating system from high water temperatures, see **figure #8**.

NOTE #1: When using bypass piping, adjust valves A and B until desired system temperature is obtained.

NOTE #2: Bypass loop must be same size piping as the supply and return piping.

7. Installation using circulators is shown in **figure #9**.
8. Installation using zone valves is shown in **figure #10**.
9. For further piping information refer to the I=B=R Installation and Piping Guide.

CONNECTING SUPPLY & RETURN PIPING

Figure #9

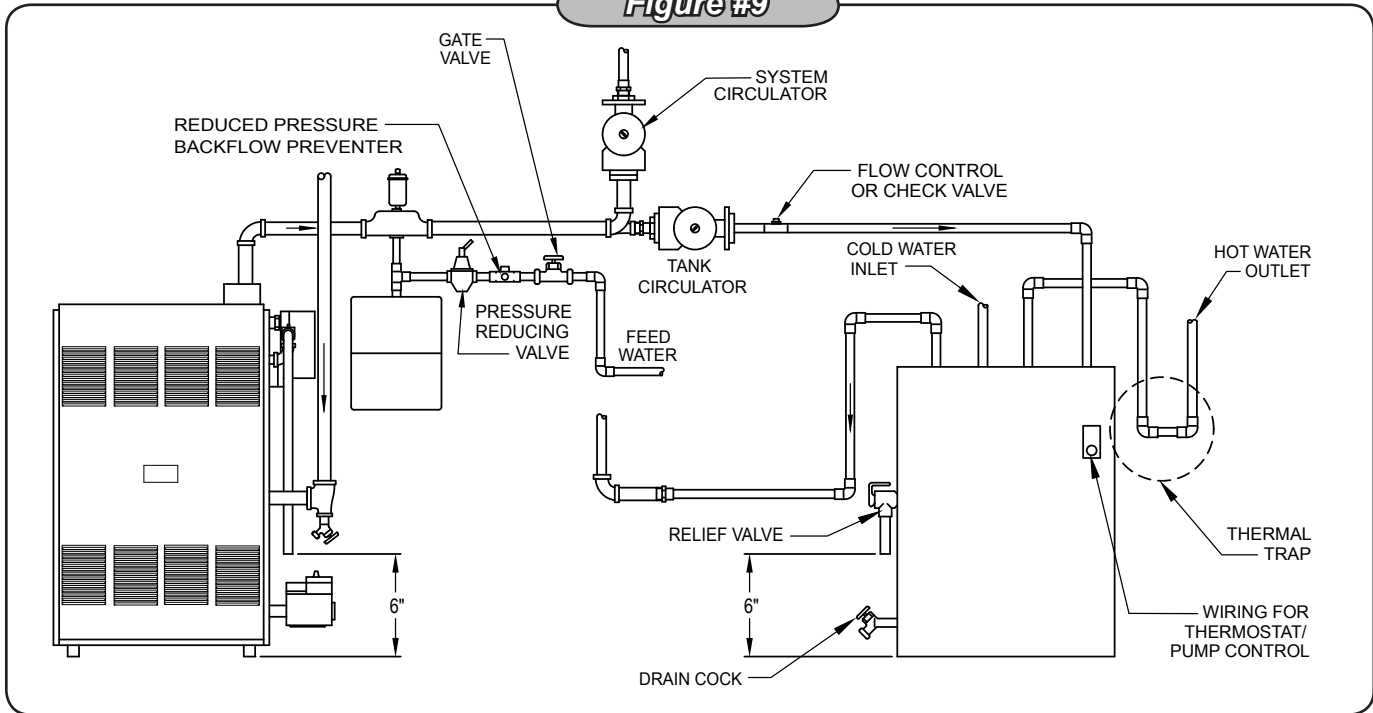
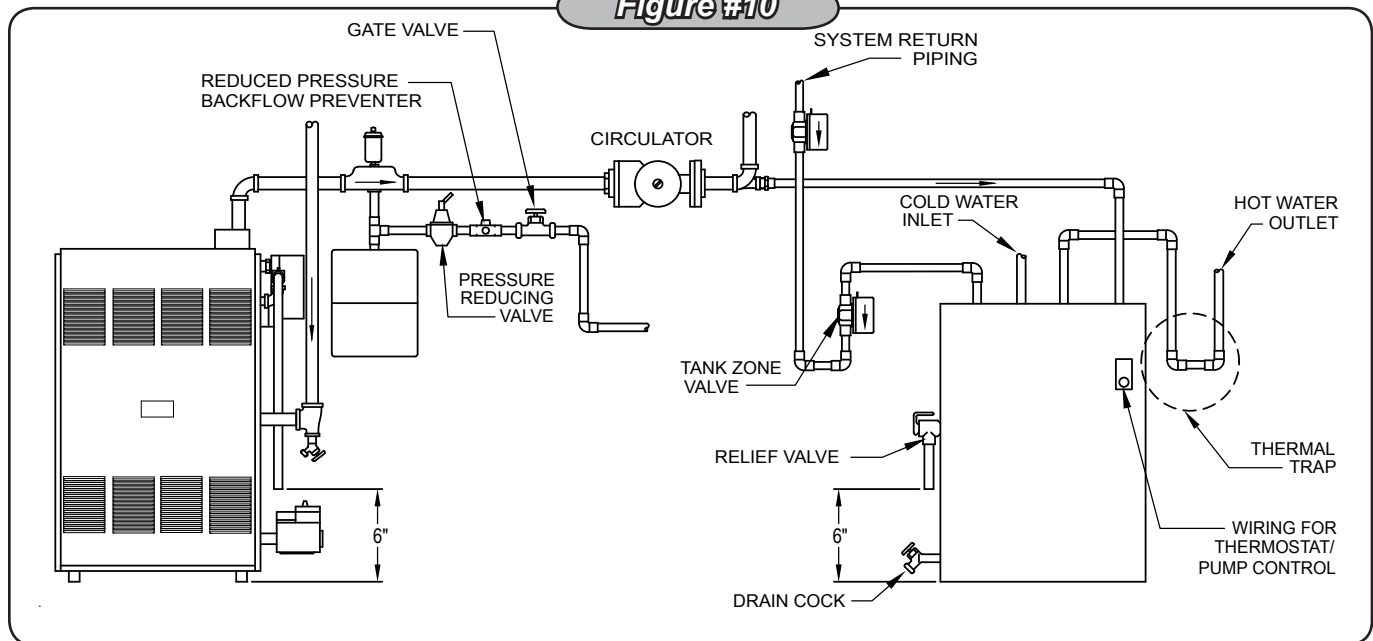


Figure #10



WARNING

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NFPA 54/ANSI Z223.1, National Fuel Gas Code and NFPA/ANSI 211, Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances. These codes contain information on special gas vents for Category II, III and IV appliances, vent sizing, location, air space clearances to combustibles and safe installation practices. The gas vent installer should be familiar with these Federal Codes as well as Local Codes and Regulations.

GENERAL INFORMATION GAS VENTS AND APPLIANCES:

By Federal Codes, gas appliances are categorized by the pressure and temperature of the flue gas vented from the appliance. Category I and II appliances are natural draft (draft hood) vented, with high flue gas temperatures (Category I), and low flue gas temperatures (Category II). Category III and IV appliances are fan forced vents with high temperature (Category III) and low temperature (Category IV) flue gasses. Appliance efficiency is directly related to flue gas temperature. Higher efficiency appliances remove more heat from the gas, so they

will have lower temperature flue products. When flue gas temperatures are lowered, corrosive condensates may form in the gas vent or in the appliance. Condensates may form in Category II, III, IV appliance vents, so special, corrosive resistant venting systems are required for higher efficiency appliances.

! WARNING

Vents for Category I appliances may not be suitable for use with Category II, III, or IV appliances because condensate may corrode the vent.

! WARNING

Vents for Category III appliances may not be suitable for use with Category I appliances because flue gas temperatures may be too high.

VENT SYSTEM MODIFICATION

When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for the proper venting of the appliances remained connected to it. If this situation occurs, the following test procedure must be followed:

REMOVAL OF BOILER FROM VENTING SYSTEM

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

1. Seal an unused opening in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any other appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to a common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliances to their previous condition of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the latest revision of the National Fuel Gas Code, ANSI Z223.1. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in the latest revision of the National Fuel Gas Code, ANSI Z223.1.

CONNECTING GAS SERVICE

1. Connect gas service from meter to control assembly in accordance with ANSI Z223.1 and local codes or utility. A ground joint union should be installed for easy removal of gas control for servicing. A drip leg or trap must be installed at the bottom of a vertical section of piping at the inlet to the boiler. A pipe compound resistant to the action of liquified petroleum gases must be used on all threaded pipe connections. Check with the local utility for location of manual shutoff valve if required. See **figure #11**.
2. The gas line should be of adequate size to prevent undue pressure drop and never smaller than the pipe size of the main gas control valve. See chart below.

Maximum Capacity of Pipe in Cubic Feet of Gas Per Hour (Gas pressure = 0.5 psig or less, pressure drop = .5 in. w.c.)							
Nominal Iron Pipe Size	Length of Pipe (Feet)						
	10'	20'	30'	40'	60'	80'	100'
1/2"	175	120	97	82	66	57	50
3/4"	360	250	200	170	138	118	103
1"	680	465	375	320	260	220	195
1 1/4"	1400	950	770	660	530	460	400

For additional information refer to the *National Fuel Gas Code Handbook, Latest Revision*.

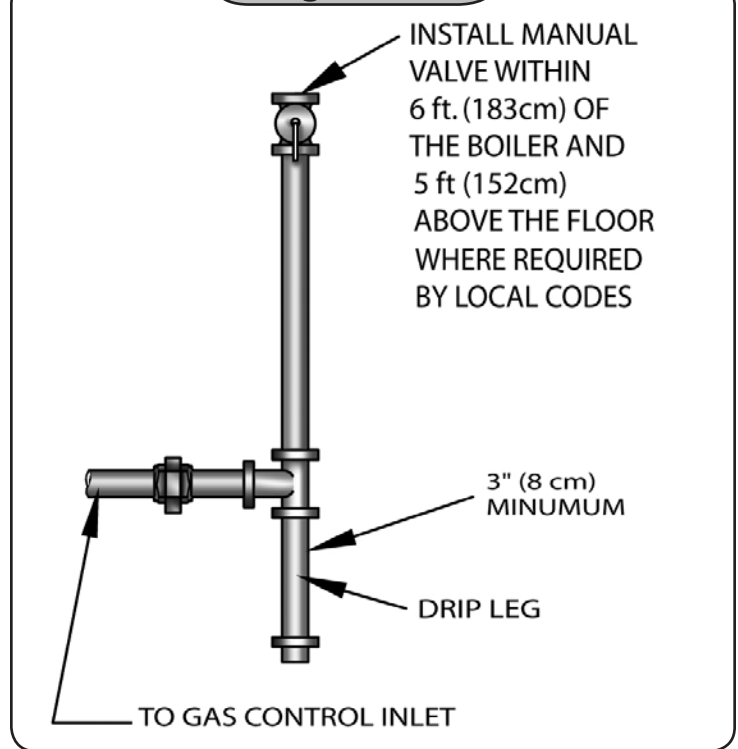


WARNING

DO NOT USE AN OPEN FLAME.

3. To check for leaks in gas piping, use a soap and water solution or other approved method.
4. Disconnect the boiler from the gas supply piping system during any pressure testing of the gas piping. After reconnecting, leak test the gas connection and boiler piping before placing the boiler back into operation.

Figure #11



PRESSURE	GAS	
	NATURAL	PROPANE
MIN. SUPPLY	5" w.c.	11" w.c.
MAX. SUPPLY	14" w.c.	14" w.c.
MANIFOLD	3.5" w.c.	10.5" w.c.

Electrical wiring must conform with the latest revision of the National Electrical Code, ANSI / NFPA No. 70 and/or local authority having jurisdiction.

1. When an external electrical source is utilized, the boiler, when installed, **MUST BE** electrically grounded in accordance with these requirements.
2. Install a fused disconnect switch between boiler and meter at a convenient location.

COMPONENT AND WIRE CODING KEYS

The keys that follow pertain to the **HOT WATER CONTROL AND INTERMITTENT IGNITION WIRING** diagrams.

COMPONENT KEY	CODING
Thermostat (millivolt)	TH-1
Thermostat (24 Volt)	TH-2
Thermostat (Line Voltage)	TH-3
Transformer (120V/24V 40VA)	TR-1
Transformer (120V/24V 50VA)	TR-2
24 Volt Gas Valve	LGV
24 Volt Gas Valve	LGV-1
Pressure Switch	PS
Manual Reset Pressure Sw.	MR-PS
Control Terminal	—○—
Relay Coil	1K
Relay Contacts	1K1
Relay Contacts	1K2
Limit Switch	LS
Manual Switch	MS
Circulator	CIR
Energy Cut-Off	ECO
Pilot Safety Coil	PSC
Wire Connection	—●—
Low Water Cut Off	LWCO
Electric Water Feeder	EWF
Power Generator	PG
Roll-Out Switch	RSW





* NOT ALL COMPONENTS LISTED ARE USED IN ALL CONTROL SYSTEMS.

Hot water control and intermittent ignition wiring for boilers with fail safe relay. See figure #12.

NOTES:

* Switches are shown in position during the heating cycle.

* If any of the original wiring supplied with the boiler is replaced it must be replaced with like wire size and type of insulation or equivalent.

WIRING CODE KEY	
	LINE VOLTAGE BY FACTORY
	LOW VOLTAGE BY FACTORY
	LINE VOLTAGE BY INSTALLER
	LOW VOLTAGE BY INSTALLER

[illegible]

ELECTRICAL WIRING

THERMOSTAT INSTALLATION

1. Thermostat should be installed on an inside wall about four feet above the floor.
2. Never install a thermostat on an outside wall.
3. Check thermostat operation by raising and lowering thermostat setting as required to start and stop the burners.
4. Instructions for the final adjustment of the thermostat are packaged with the thermostat (adjusting heating anticipator, calibration, etc.)

THINGS TO AVOID WHEN LOCATING THERMOSTATS

DEAD SPOTS:

Corners and alcoves

Behind doors

COLD SPOTS:

Concealed pipes or ducts

HOT SPOTS:

Concealed pipes
Fireplace or chimney

Stairwells - drafts

TV sets

Radios

Unheated rooms on other side of wall

Lamps

Direct sunlight

Outside walls

Kitchens

LIGHTING INSTRUCTIONS

WARNING

IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

CAUTION

Before operating, make certain the boiler and system are full of water to minimum pressure (this is usually 12 lbs. per square inch on most systems) and system is vented of air. See the operating and lighting instructions.

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING

If these instructions are not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch
- Do not use any phone or mobile electronics in your building.
- Immediately call your gas supplier from a neighbor's phone.

- Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to move the system control switch. Never use tools. If the switch will not move by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

WARNING

Force or attempted repair may result in a fire or explosion.

- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

LIGHTING PROCEDURE FOR BOILER WITH INTERMITTENT PILOT SYSTEM

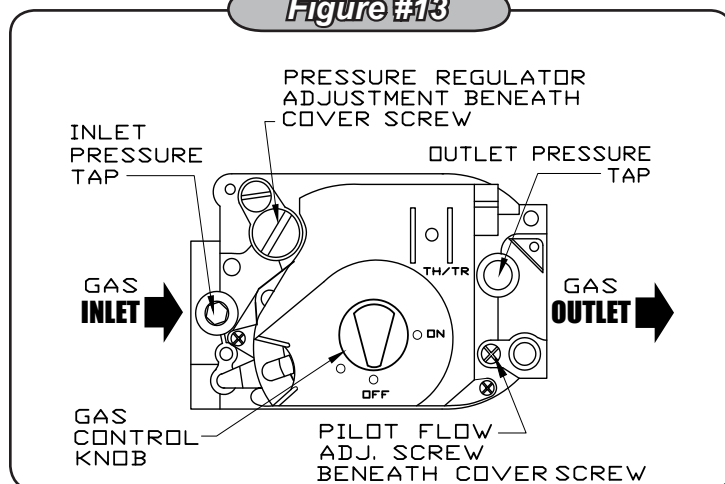
1. **STOP!** Read the safety information in the user's information manual.
2. Set thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. **DO NOT** try to light the burner by hand.
5. Turn the gas control knob clockwise ↻ to "OFF". (See **Figure #13**)
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, **STOP!** Follow "What To Do If You Smell Gas" in the safety information section. If you don't smell gas, go on to the next step.
7. Turn the gas control knob counterclockwise ↻ to "ON".
8. Turn on all electrical power to the appliance.
9. Set the thermostat to desired setting.
10. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service techni-

cian or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Turn gas control knob clockwise ↻ to "OFF" Do Not Force.

Figure #13



SEQUENCE OF OPERATIONS

ON A CALL FOR HEAT:

1. The thermostat will actuate, completing the circuit between terminals T and T.
2. The R8222C relay coil will energize thus pulling in the relay contacts.
3. The circulator starts and power is switched to the limit. If limit circuit is closed the venter motor and TF-2 transformer are energized.
4. The venter motor starts and develops static pressure.
5. When the static pressure is reached the pressure switch pulls in completing the circuit between TF-2 and the intermittent ignition control.
6. The intermittent ignition control opens the pilot valve and ignites pilot. After pilot is proven the main burner will ignite.
7. In the event the boiler water temperature exceeds the high limit setting the power will be interrupted to the venter motor, and TF-2 thus interrupting power to the ignition system. Power will remain off until the water temperature drops below the high limit setting. The circulator will continue to operate under this condition until the thermostat is satisfied.
8. Should the air flow (static pressure) be interrupted (example blocked flue, etc.), the pressure switch will sense a drop in pressure, opening the circuit between the ignition system and TF-2. The venter motor will continue to operate until static pressure is reached or thermostat is satisfied.
9. In the event the flow of combustion products through any part of the boiler flueway becomes blocked, a flame safety roll-out switch will shut off the main burners. If this condition occurs, do not attempt to place the boiler back operation.
10. When the thermostat is satisfied power is interrupted to the relay coil and the relay drops out cutting power to the circulator, venter motor, and TF-2.

GENERAL INSTRUCTION FOR SEASONAL STARTUP & MAINTENANCE

It is suggested that a qualified service agency be employed to make an annual inspection of the boiler and the heating system. They are experienced in making the inspection outlined below.

In the event repairs or corrections are necessary they can make the proper changes for safe operation of the boiler.



CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

Verify proper operation after service.

If the venter has oil cups, lubricate venter motor once a month during the heating season with a few drops of non-detergent motor oil (SAE 20 or 30). Replace the rubber plugs when finished.



CAUTION

DO NOT OVER OIL.

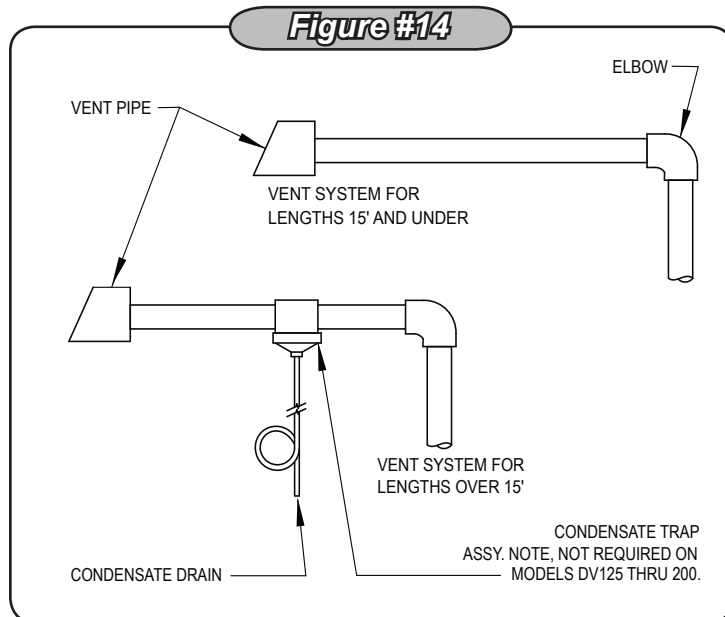
BEGINNING OF EACH HEATING SEASON

- Before seasonal start-up, it is highly advisable to have a certified service agency inspect the system:
 - Check the boiler for soot and scale build up in the flues.
 - Clean the burners.
 - Check the gas input rate to maintain high operating efficiency.
- The service agency should make certain the system is filled with water to minimum pressure (approximately 12 pounds per square inch) and open air vents (if used) to expel any air that may have accumulated in the system.
- Check automatic air vents for leakage.
- Inspect venting system at the start of each heating season. Check the pipe from the boiler for signs of deterioration and sagging joints. Repair if necessary. Remove the vent pipe from the boiler and check for obstructions.
- Clean condensate tee & trap. Periodic cleaning of the condensate collection system is required. When a condensate collection system is installed in a venting system, it is recommended that the cleaning become a part of the annual servicing.

THE PROCEDURE FOR CLEANING THIS SYSTEM FOLLOWS:

- Remove tubing from condensate tee.
 - Empty all liquid from tubing.
 - Rinse tubing inside & out in a sink with water.
 - If tubing cannot be cleaned inside, the tubing should be replaced with the same type and size of tubing.
 - Replace tubing as described in **figure #14**. (Fill trap with water.)
 - Visually inspect entire piping system and if any leaks appear, have them repaired as soon as possible. **DO NOT** use petroleum based stop leak compounds.
- 6. Check venter assembly static pressure as follows:**
- With the boiler off, disconnect the white compression fitting on the pressure switch.
 - Connect a slope manometer to the compression fitting with additional tubing.
 - Turn the boiler on and read suction pressure on the manometer. Reading should be negative (-) .55 ± .05 inches of water column or higher for the 50B thru 150B and negative (-) .65 ± .05 inches of water column or higher for the 200B.
- 7. If static pressures are not at the minimum allowable level (listed above), check vent pipe for obstructions.**

Figure #14

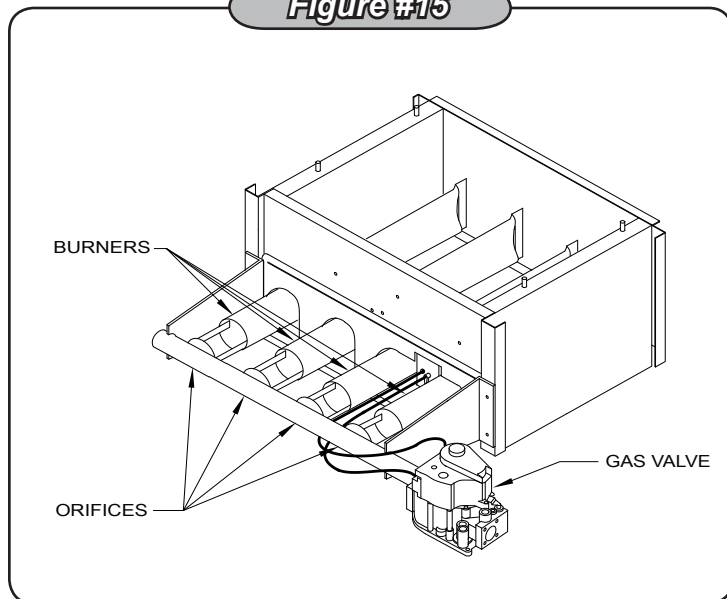


GENERAL INSTRUCTION FOR SEASONAL START UP AND MAINTENANCE

8. The following procedure should be followed to clean and check the boiler flue passageways:

A. Remove the burners from the combustion chamber by raising the burners up from the manifold orifices and pulling toward the front of the boiler. See **figure #15**.

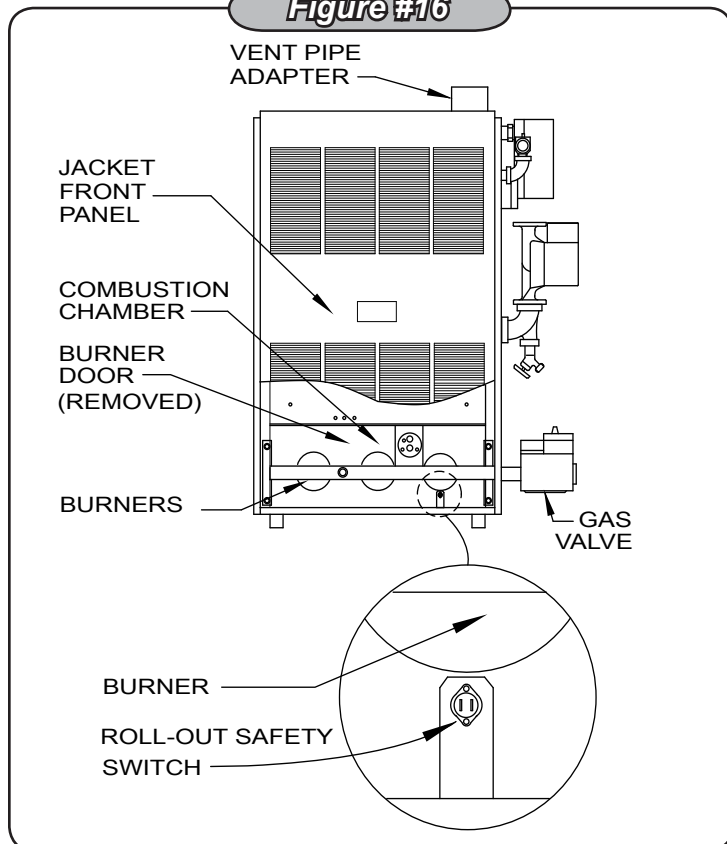
Figure #15



B. Disconnect the vent pipe from the vent adapter.

C. Remove the top jacket panel. See **Figure #16**.

Figure #16

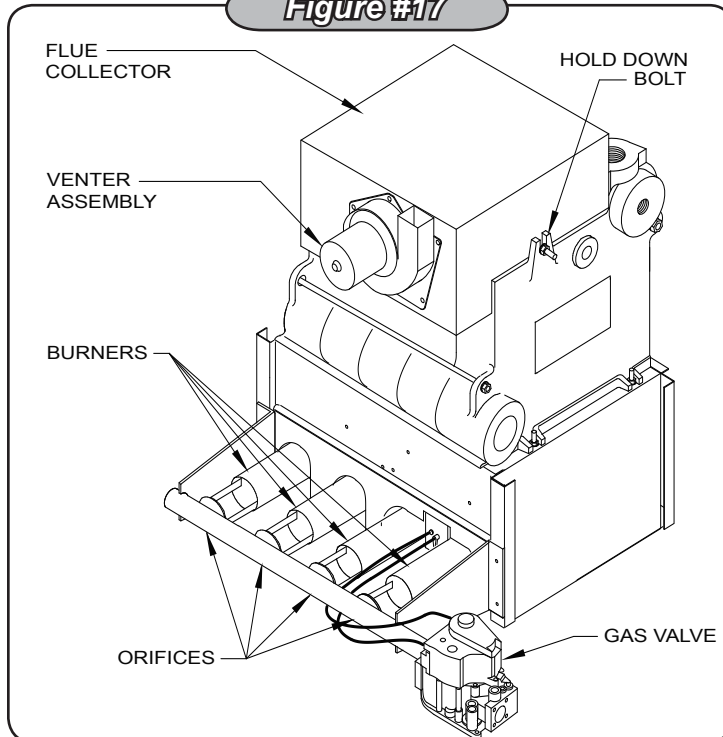


D. Disconnect the white compression fitting from the pressure switch.

E. Disconnect venter wires from relay.

F. Remove the flue collector and venter from the boiler castings by loosening the hold-down bolts located on each side of the collector. See **figure #17**.

Figure #17



G. Visually inspect the venter assembly for any unusual wear or dirt build up. Clean with vacuum if necessary.

H. Place a sheet of heavy paper or similar material over the bottom of the combustion chamber and brush down the flue passageways. The soot and scale will collect on the paper and is easily removed with the paper.

I. Vacuum out base and flueways and reassemble the boiler in reverse order.

J. Seal flue collector and vent adapter with high temperature silicone. (+400°)

K. Start boiler to ensure proper operating condition.

9. Keep the area around the boiler clean and free of combustible materials such as gasoline, paints, paint thinner and other such flammable vapors and liquids.

10. The free flow of combustion and ventilating air to the boiler and boiler room must not be restricted or blocked.

11. Some circulators require periodic servicing. These circulators usually have oil cups or openings at each end of the motor and one for the shaft bearing. Put about one teaspoon of SAE 20 or 30 non-detergent motor oil in each

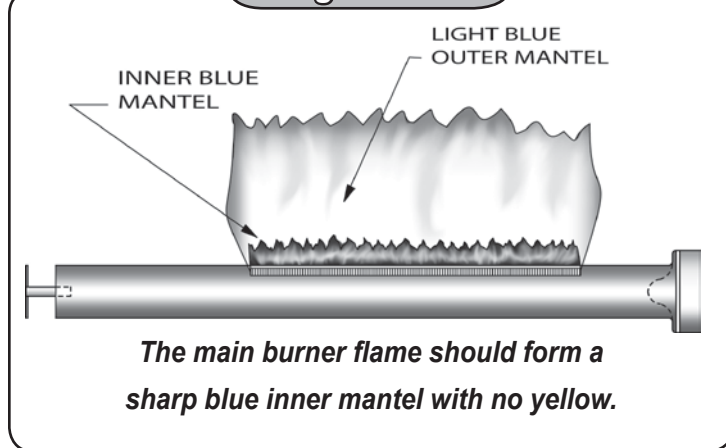
GENERAL INSTRUCTION FOR SEASONAL START UP AND MAINTENANCE

opening twice per year. DO NOT OVER OIL. Follow the manufacturers instructions attached to the circulator. When oil cups or holes are not provided, bearings are either permanently lubricated or water lubricated.

12. Visually check the main burners and pilot flame at the start of each heating season and again midway through the season.

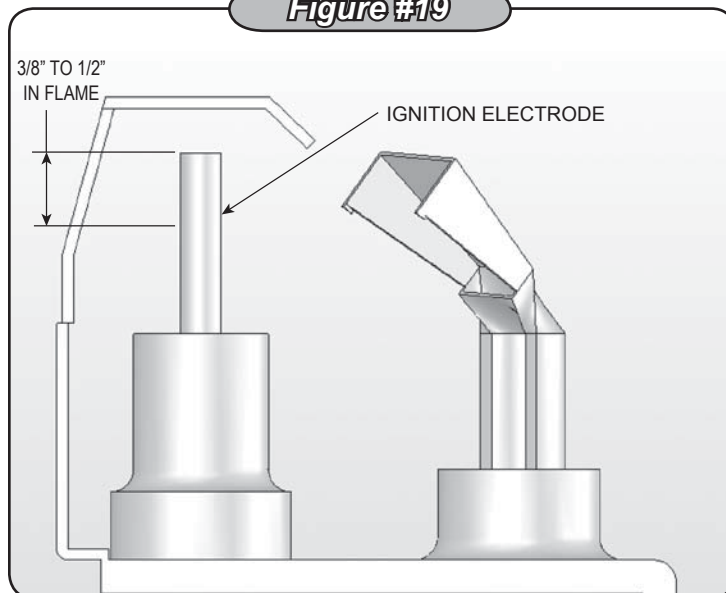
- A. Check the burner throats and burner orifices for lint and dust obstructions. See **figure #17**.
- B. The main burner flame should have a well defined inner blue mantel with a lighter blue outer mantel. See **figure #18**.

Figure #18



- C. The pilot flame should envelop $\frac{3}{8}$ to $\frac{1}{2}$ inch of the tip of the pilot sensing device. See **figure #19**.

Figure #19



13. Adjusting the pilot flame:

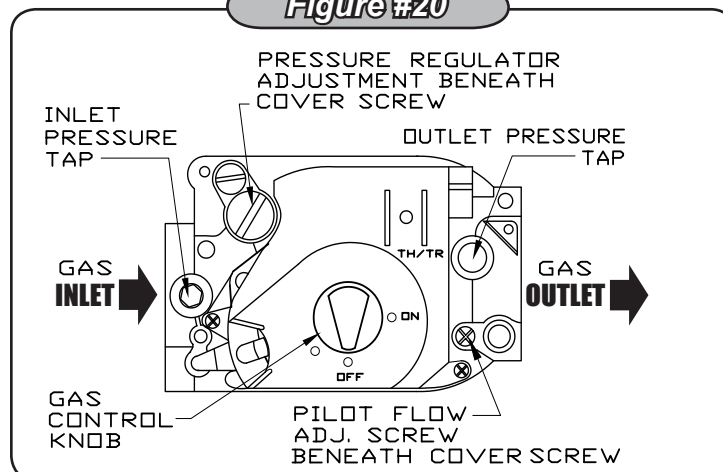
- A. Remove the pilot adjustment cover screw.

- B. Turn inner screw (adjustment screw) clockwise ↻ to decrease and counterclockwise ↻ to increase the pilot flame, see figure #20.
- C. After adjustment, be sure to replace cover screw to prevent possible gas leakage.
- D. The main burners and the pilot burner should be checked for signs of corrosion or scale build up.
- E. Clean main burners and pilot burner with a steel bristle brush.

CHECK GAS INPUT RATE TO BOILER

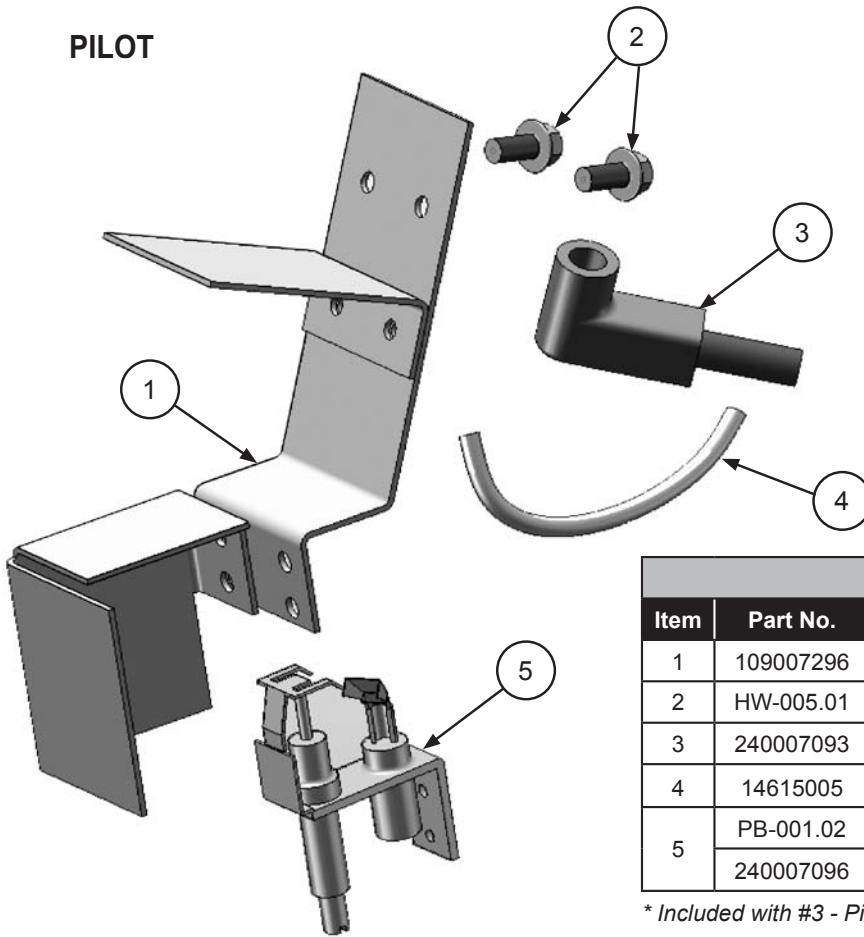
1. Maximum permissible gas supply pressure must not be higher and minimum supply pressure must not be lower than what is specified on the rating plate.
2. To check for proper flow of natural gas to boiler using the gas meter, proceed as follows:
 - A. Turn off the gas supply to all other appliances, except the boiler.
 - B. With the boiler operating, determine the flow of gas through the meter for two minutes and multiply by 30 to get the hourly rate (in cubic feet).
 - C. Divide the input rate shown on the rating plate by the heating value of the gas as obtained from the local gas company. This will determine the number of cubic feet of gas required per hour.
 - D. If minor adjustment is necessary, adjust the pressure regulator on the combination gas control. Increase or decrease manifold pressure to obtain gas input required as described on the rating plate. To increase, turn the regulator adjusting screw clockwise ↻ or counterclockwise ↻ to decrease pressure, see Figure #20. The manifold pressures are taken at the outlet side of the gas valve.
 - E. Relight all the other appliances turned off in step "a." above. Be sure all pilot burners are operating.

Figure #20



REPLACEMENT PARTS

PILOT



SPARK PILOT			
Item	Part No.	Description	Qty.
1	109007296	PILOT BRACKET ASSEMBLY	1
2	HW-005.01	BRACKET SCREW	2
3	240007093	SPARK CABLE	1
4	14615005	PILOT TUBING, 1/8" x 24"	1
5	PB-001.02	Natural Gas Q345A PILOT	1
	240007096	LP Q345A Pilot	

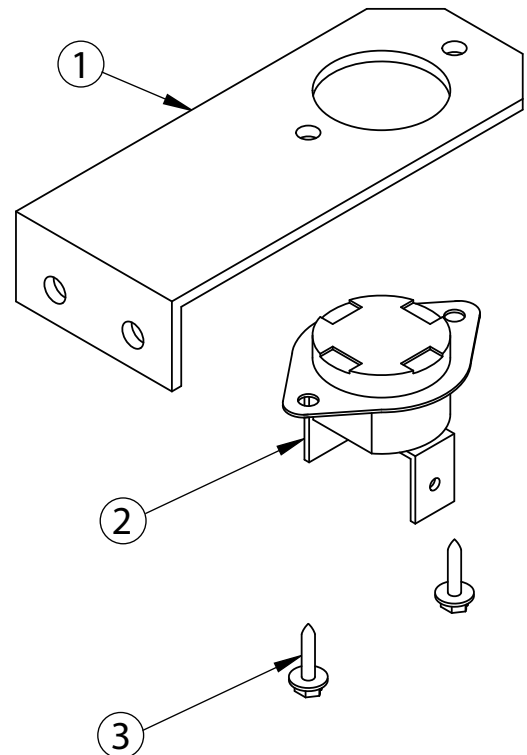
* Included with #3 - Pilot Tube Assembly Kit (above)

ROLLOUT & SPILL SWITCH

Item #	Description	Part #	Qty.
1	TEMP. SENSOR BRACKET	3262001	1
2	CONTROL-FIXED TEMPERATURE THERMO (ROLLOUT SWITCH)	AQ02101	1
3	SCREW - #6 X 1/4 HEX HD	HW06501	2

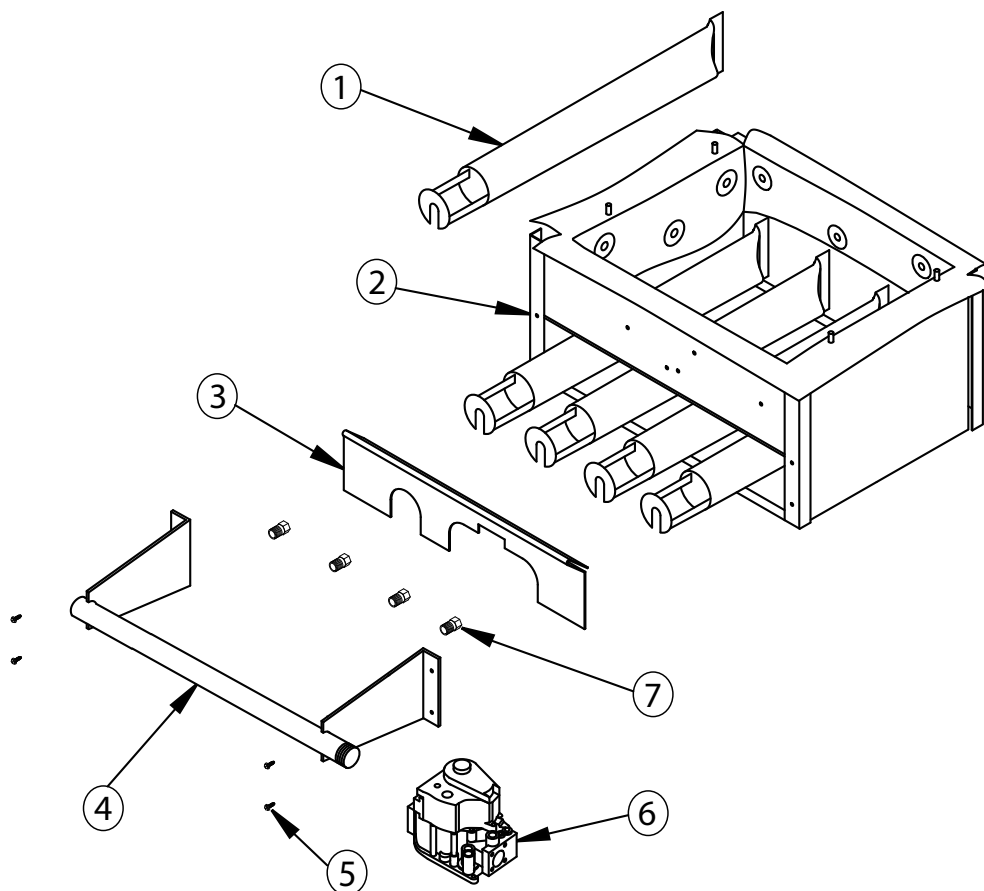
The rollout switch is located on the base.

NOTE: The quantities above are for each switch.



REPLACEMENT PARTS

BASE

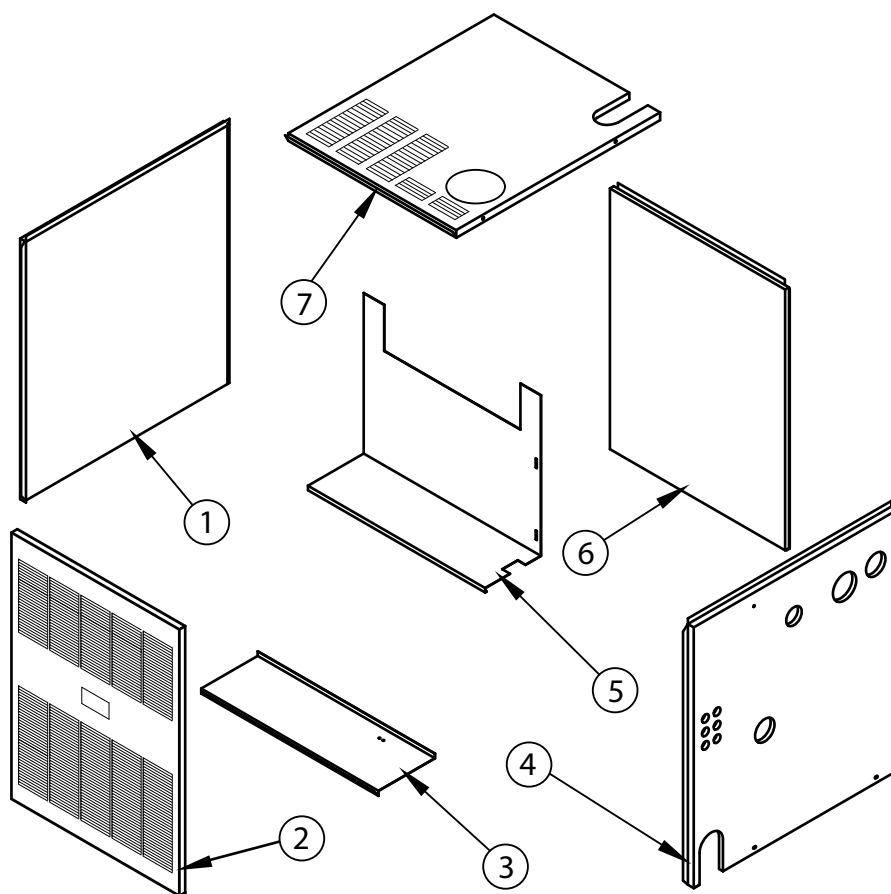


Item #	Description	Part #	Qty.
1	BURNER TUBE 1 1/2" - -50	240005543	1
	BURNER TUBE 1 1/2" - -100		2
	BURNER TUBE 1 1/2" - -125 & 150		3
	BURNER TUBE 1 1/2" - -200		4
2	BASE W/INSUL - -50	5611607	1
	BASE W/INSUL - -100	5611608	
	BASE W/INSUL - -125 & 150	5611609	
	BASE W/INSUL - -200	5611604	
3	BURNER DOOR - -50	32512501	1
	BURNER DOOR - -100	32523001	
	BURNER DOOR - -125 & 150	32523101	
	BURNER DOOR - -200	32523102	
4	MANIFOLD - -50	356-2-1.01	1
	MANIFOLD - -100	356-2-1.02	
	MANIFOLD - -125 & 150	356-2-1.03	
	MANIFOLD - -200	356-2-1.04	

Item #	Description	Part #	Qty.
5	SCREW 3/8" HEX	HW005.01	4
6	GAS VALVE VR8204H-1006 - -50 - 150 SPARK NAT	VG01101	1
	GAS VALVE VR8304H-4206 - -200 SPARK NAT	VG01103	
	GAS VALVE VR83043216 - -50 - 200 LP	VG01104	
7	ORIFICE 3.2mm - 50, 100, 150, 200	240007406	*
	ORIFICE 2.9mm - 125	240007404	
	ORIFICE #47 LP - 50, 100, 150, 200	240007403	
	ORIFICE #49 LP - 125	240007402	
NOT SHOWN	Combustible Base Flooring - 50	325-2-8.01	1
	Combustible Base Flooring - 100	325-2-8.02	
	Combustible Base Flooring - 125, 150	325-2-8.03	
	Combustible Base Flooring - 200	325-2-8.04	

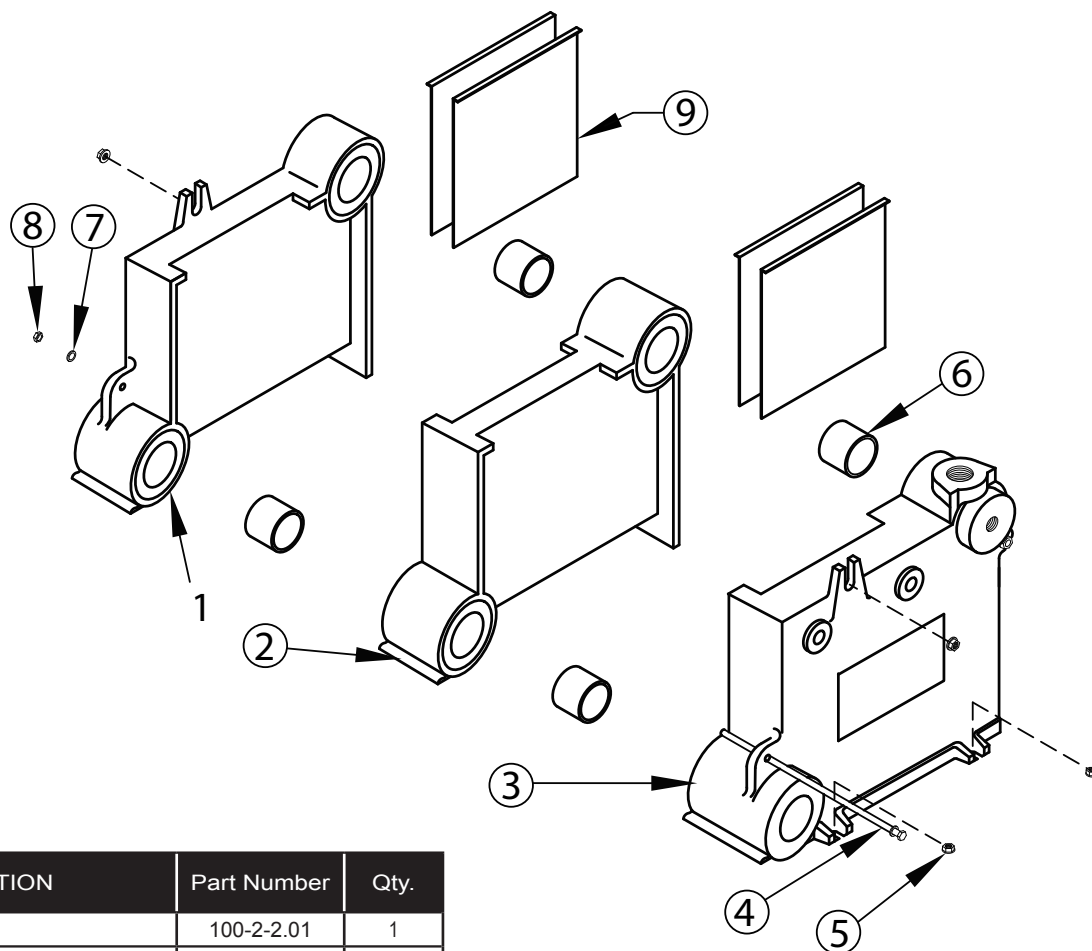
*Orifice Qty's per model: Model 50- qty 1. Model 100- qty 2. Model 125 & 150- qty 3. Model 200- qty 4.

JACKET



ITEM	DESCRIPTION	PART NUMBER	QTY.
1	PANEL - LEFT 50-200	3162702	1
2	PANEL - FRONT -50	315-2-19.01	1
	PANEL - FRONT -100	315-2-19.02	
	PANEL - FRONT -125 & 150	315-2-19.03	
	PANEL - FRONT -200	315-2-19.04	
3	PANEL - BASE -50	315-2-12.01	1
	PANEL - BASE -100	315-2-12.02	
	PANEL - BASE -125 & 150	315-2-12.03	
	PANEL - BASE -200	315-2-12.04	
4	PANEL - RIGHT -50-200	3162701	1
5	PANEL - SEPARATOR -50	31522401	1
	PANEL - SEPARATOR -100	31522402	
	PANEL - SEPARATOR -125 & 150	31522403	
	PANEL - SEPARATOR -200	31522404	

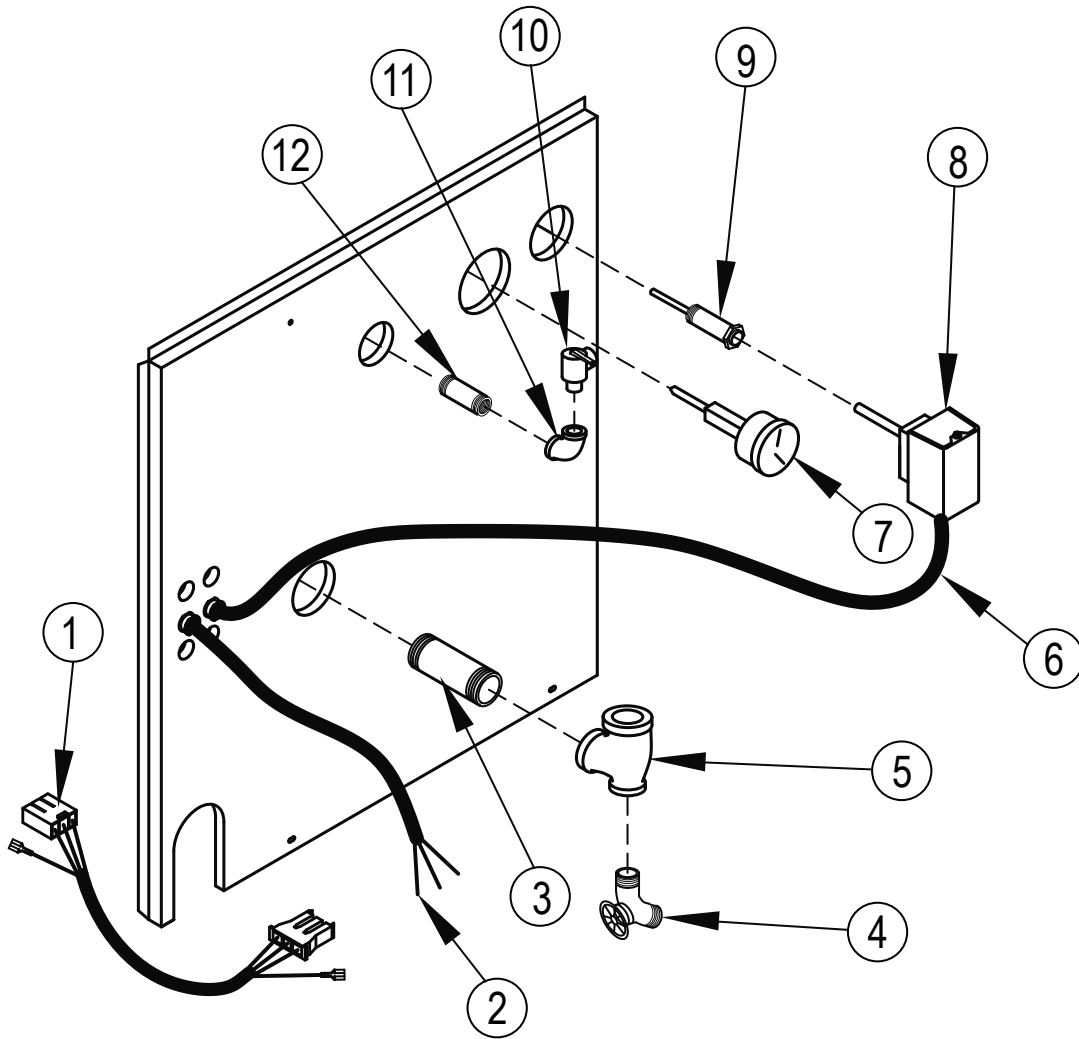
HEAT EXCHANGER



Item #	DESCRIPTION	Part Number	Qty.
1	LEFT HAND SECTION	100-2-2.01	1
2	CENTER SECTION, -100	100-2-1.01	1
	CENTER SECTION, -125		2
	CENTER SECTION, -150		2
	CENTER SECTION, -200		3
3	RIGHT SECTION	100-2-3.01	1
4	TIE ROD ¼ X 11½, -100	HW-011.01	2
	TIE ROD ¼ X 15½ -125 & 150	HW-011.03	
	TIE ROD 1/4X19.1/2 -200	HW-011.05	
5	NUT 5/16-18 WISLOCK 6	1330001	6
	PIPE FIT BUSH 3/4 X 1/4 NPT	1060002	1
	PIPE-NPL 1.1/4X4.1/2 NPT	1310002	1
6	PUSH NIPPLE 2" MACH., -50	43300976	2
	PUSH NIPPLE 2" MACH., -100		4
	PUSH NIPPLE 2" MACH., -125 & 150		6
	PUSH NIPPLE 2" MACH., -200		8
9	BAFFLE -50 (2 per Flueway)	3461601	2
	BAFFLE -100 (2 per Flueway)	3472301	4
	BAFFLE -125 & 150 (2 per Flueway)		6
	BAFFLE -200 (2 per Flueway)		8
7	WASH-5/16 FLAT STL ZP	HW-008.01	4
8	NUT-1/4-20 HEX-STL ZP	HW-003.02	2

COMPLETE HEAT EXCHANGER ASSEMBLY	
HEAT EXCHANGER 3 SECTION -100	100-2-7.01
HEAT EXCHANGER 4 SECTION -125 & 150	100-2-7.02
HEAT EXCHANGER 5 SECTION -200	100-2-7.03
HEAT EXCHANGER 2 SECTION -50	100-2-7.06

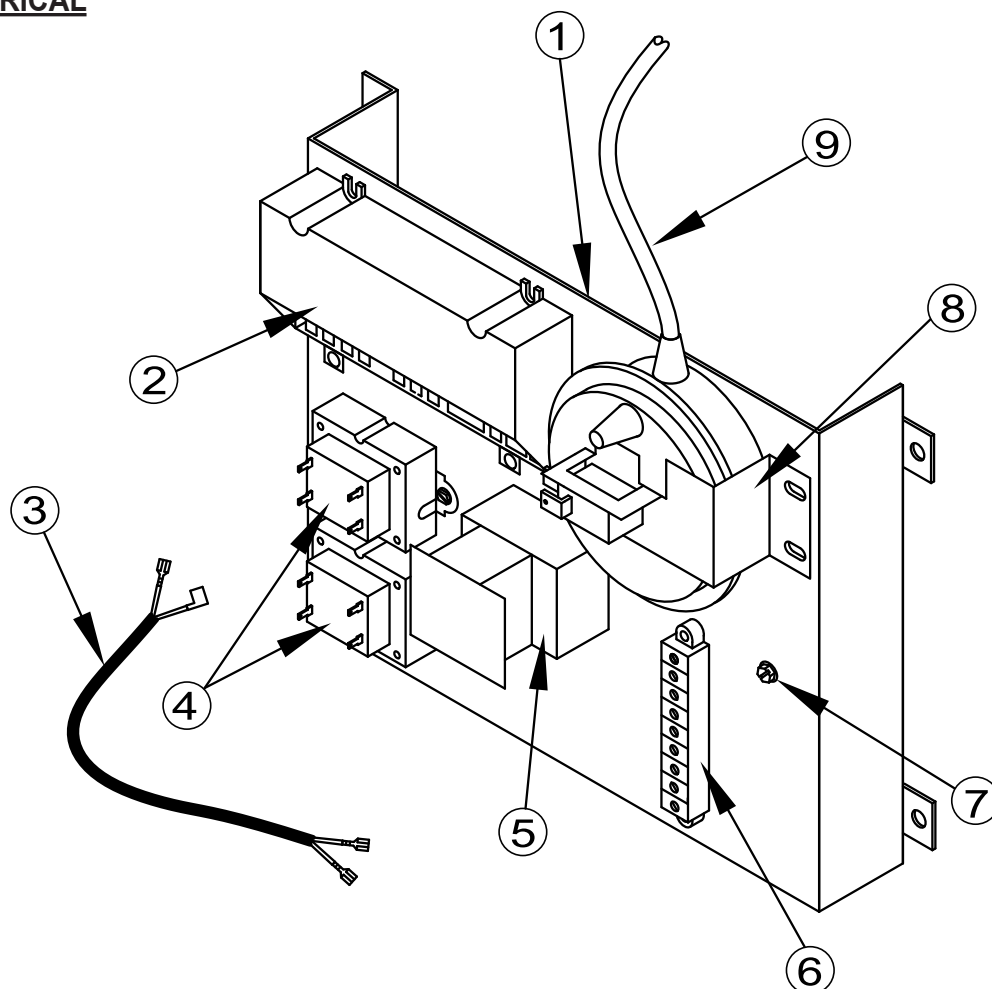
PIPING & CONTROLS



ITEM	DESCRIPTION	P/N	QTY.
1	HARNESS IGN/GV 36"	37413601	1
2	HARNESS - CIRCULATOR 72"	37519501	1
3	PIPE - NPL 1¼ X 4½ NPT 1	1310002	1
4	DRAIN - SHORT	HW-016.03	1
5	PIPE - TEE 1¼ X ¾ X 1¼	1510001	1
6	HARNESS- CONTROL/LIMIT 38"	37518901	1
7	GAUGE - THERALTIMETER	1260006	1
8	CONTROL L4080B	AQ02201	1
9	WELL ¾" X 3"	AQ-020.01	1
10	RELIEF VALVE 30# ¾"	VR-001.01	1
11	PIPE - ELBOW ¾" 90°	1190001	1
12	PIPE - NPL ¾" X 4"	1310001	1

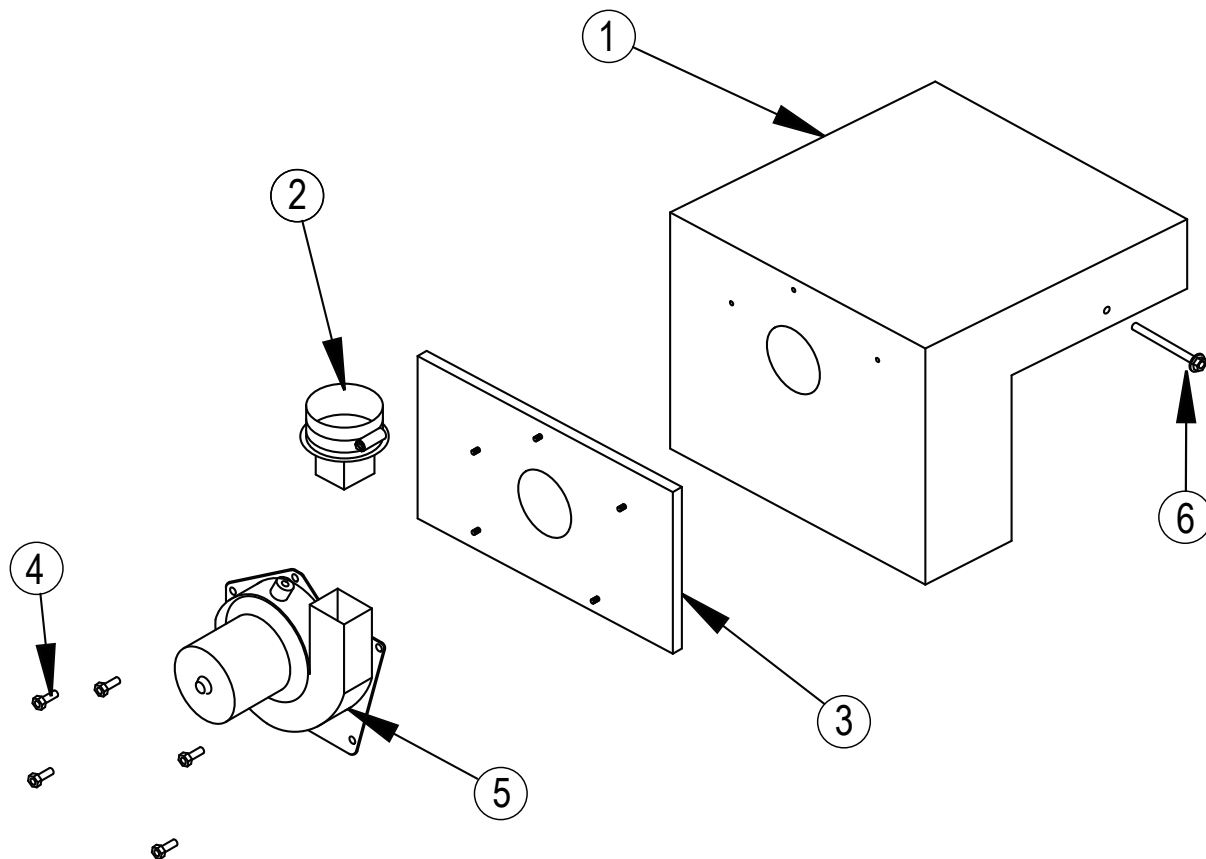
REPLACEMENT PARTS

ELECTRICAL



ITEM	DESCRIPTION	P/N	QTY.
1	CONTROL SUPPORT BRACKET	31522201	1
2	PLT SPARK CONTROL	14662070	1
3	WIRE ROLLOUT SWITCH 40"	37614501	1
4	TRANSFORMER - 40VA	550001339	2
5	CONTROL R8222C-1008 (RELAY)	1410001	1
6	9 TERM STRIP	EF04001	1
7	SCREW 10-32X5/16 GREEN GROUND	HW09001	1
8	PRESSURE SWITCH (FS6205A-2413) 50B - 150B	SS00801	1
	PRESSURE SWITCH (FS6273A-3065) 200B ONLY	SS00802	1
9	HW TUBE SIL ORANGE 1/8ID	HW09701	1
FULLY ASSEMBLED CONTROL BRACKET			
CONTROL BRACKET SUB-ASSY 50B - 150B		31522901	
CONTROL BRACKET SUB-ASSY 200B		31522902	
(P/N 31522901 & 31522902 INCLUDE PART # 1-8 & ALL WIRING)			

FLUE COLLECTOR & VENTER COMPONENTS



ITEM	DESCRIPTION	P/N	QTY.
1	FLUE COLLECTOR -50	34524802	1
	FLUE COLLECTOR -100	34524804	
	FLUE COLLECTOR -125	34524805	
	FLUE COLLECTOR -150	34524806	
	FLUE COLLECTOR -200	34524808	
2	VENT ADAPTER -50, -100, & -125	345-2-7.01	1
	VENT ADAPTER -150 & -200	345-2-7.02	
3	VENTER MOUNTING PLATE -50 ONLY	34524902	1
4	HW SCR ¼ -20x ½	HW-005.01	5
5	VENTER -50--200	DC00402	1
6	BOLT 5/16"-18 x 1 ½	14695039	2

